

Course Title: Compilers and Languages
(First term)Course Code: CCE3113 3rd year
Allowed time: 15 minutesStudent Name:Section No.:Quiz2

(10 marks)

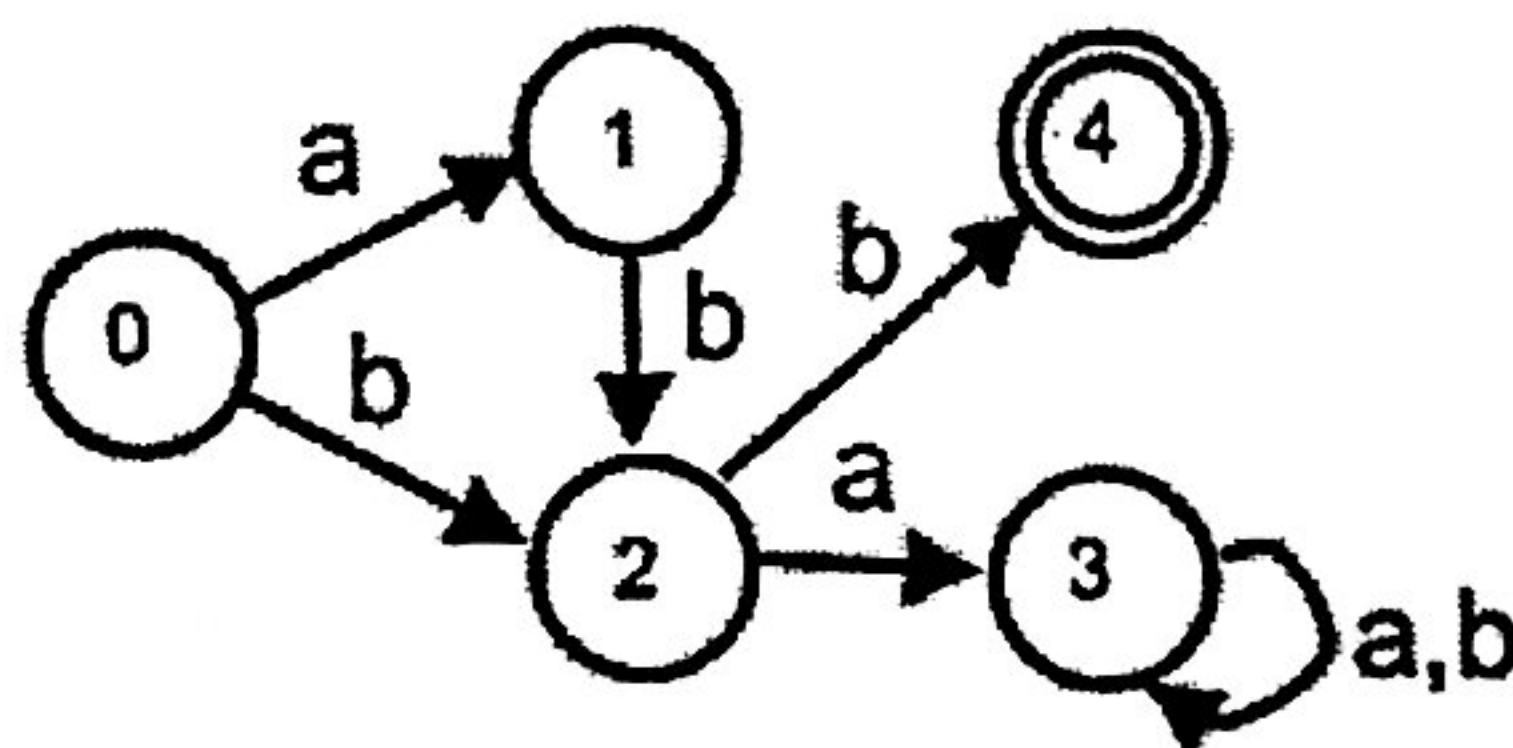
1 Consider the context free grammar

$$S \rightarrow SS+ \mid SS^* \mid a$$

- Show how the string $aa+a^*$ can be generated by this grammar.
- Construct a parse tree for this string.
- What language is generated by this grammar? Justify your answer.

2. Which of the grammars are ambiguous?

- $S \rightarrow 0S1 \mid 01$
- $S \rightarrow +SS \mid -SS \mid a$
- $S \rightarrow S(S)S \mid \epsilon$
- $S \rightarrow aSbS \mid bSaS \mid \epsilon$
- $S \rightarrow a \mid S+S \mid SS \mid S^* \mid (S)$

3. Consider the alphabet $\Sigma = \{a; b\}$. Define the shortest, regular expression that generates strings over Σ that contain exactly one "a" and at least one "b".4. Given the Finite Automaton below with initial state 0 and alphabet $\{a,b\}$ answer the following questions:

- Why is this FA a Non-Deterministic Finite Automaton (NFA)?
- Convert this NFA to a DFA using the closure computation.
- What is the Regular Expression matched by this NFA?

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Best wishes